[ ]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

[ ]:
```
ak = sns.load_dataset('car_crashes')
ak
```

[ ]:

| | total | speeding | alcohol | not_distracted | no_previous | ins_premium | \ |
|---|---|---|---|---|---|---|---|
| 0 | 18.8 | 7.332 | 5.640 | 18.048 | 15.040 | 784.55 | |
| 1 | 18.1 | 7.421 | 4.525 | 16.290 | 17.014 | 1053.48 | |
| 2 | 18.6 | 6.510 | 5.208 | 15.624 | 17.856 | 899.47 | |
| 3 | 22.4 | 4.032 | 5.824 | 21.056 | 21.280 | 827.34 | |
| 4 | 12.0 | 4.200 | 3.360 | 10.920 | 10.680 | 878.41 | |
| 5 | 13.6 | 5.032 | 3.808 | 10.744 | 12.920 | 835.50 | |
| 6 | 10.8 | 4.968 | 3.888 | 9.396 | 8.856 | 1068.73 | |
| 7 | 16.2 | 6.156 | 4.860 | 14.094 | 16.038 | 1137.87 | |
| 8 | 5.9 | 2.006 | 1.593 | 5.900 | 5.900 | 1273.89 | |
| 9 | 17.9 | 3.759 | 5.191 | 16.468 | 16.826 | 1160.13 | |
| 10 | 15.6 | 2.964 | 3.900 | 14.820 | 14.508 | 913.15 | |
| 11 | 17.5 | 9.450 | 7.175 | 14.350 | 15.225 | 861.18 | |
| 12 | 15.3 | 5.508 | 4.437 | 13.005 | 14.994 | 641.96 | |
| 13 | 12.8 | 4.608 | 4.352 | 12.032 | 12.288 | 803.11 | |
| 14 | 14.5 | 3.625 | 4.205 | 13.775 | 13.775 | 710.46 | |
| 15 | 15.7 | 2.669 | 3.925 | 15.229 | 13.659 | 649.06 | |
| 16 | 17.8 | 4.806 | 4.272 | 13.706 | 15.130 | 780.45 | |
| 17 | 21.4 | 4.066 | 4.922 | 16.692 | 16.264 | 872.51 | |
| 18 | 20.5 | 7.175 | 6.765 | 14.965 | 20.090 | 1281.55 | |
| 19 | 15.1 | 5.738 | 4.530 | 13.137 | 12.684 | 661.88 | |
| 20 | 12.5 | 4.250 | 4.000 | 8.875 | 12.375 | 1048.78 | |
| 21 | 8.2 | 1.886 | 2.870 | 7.134 | 6.560 | 1011.14 | |
| 22 | 14.1 | 3.384 | 3.948 | 13.395 | 10.857 | 1110.61 | |
| 23 | 9.6 | 2.208 | 2.784 | 8.448 | 8.448 | 777.18 | |
| 24 | 17.6 | 2.640 | 5.456 | 1.760 | 17.600 | 896.07 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 25 | 16.1 | 6.923 | 5.474 | 14.812 | 13.524 | 790.32 |
| 26 | 21.4 | 8.346 | 9.416 | 17.976 | 18.190 | 816.21 |
| 27 | 14.9 | 1.937 | 5.215 | 13.857 | 13.410 | 732.28 |
| 28 | 14.7 | 5.439 | 4.704 | 13.965 | 14.553 | 1029.87 |
| 29 | 11.6 | 4.060 | 3.480 | 10.092 | 9.628 | 746.54 |
| 30 | 11.2 | 1.792 | 3.136 | 9.632 | 8.736 | 1301.52 |
| 31 | 18.4 | 3.496 | 4.968 | 12.328 | 18.032 | 869.85 |
| 32 | 12.3 | 3.936 | 3.567 | 10.824 | 9.840 | 1234.31 |
| 33 | 16.8 | 6.552 | 5.208 | 15.792 | 13.608 | 708.24 |
| 34 | 23.9 | 5.497 | 10.038 | 23.661 | 20.554 | 688.75 |
| 35 | 14.1 | 3.948 | 4.794 | 13.959 | 11.562 | 697.73 |
| 36 | 19.9 | 6.368 | 5.771 | 18.308 | 18.706 | 881.51 |
| 37 | 12.8 | 4.224 | 3.328 | 8.576 | 11.520 | 804.71 |
| 38 | 18.2 | 9.100 | 5.642 | 17.472 | 16.016 | 905.99 |
| 39 | 11.1 | 3.774 | 4.218 | 10.212 | 8.769 | 1148.99 |
| 40 | 23.9 | 9.082 | 9.799 | 22.944 | 19.359 | 858.97 |
| 41 | 19.4 | 6.014 | 6.402 | 19.012 | 16.684 | 669.31 |
| 42 | 19.5 | 4.095 | 5.655 | 15.990 | 15.795 | 767.91 |
| 43 | 19.4 | 7.760 | 7.372 | 17.654 | 16.878 | 1004.75 |
| 44 | 11.3 | 4.859 | 1.808 | 9.944 | 10.848 | 809.38 |
| 45 | 13.6 | 4.080 | 4.080 | 13.056 | 12.920 | 716.20 |
| 46 | 12.7 | 2.413 | 3.429 | 11.049 | 11.176 | 768.95 |
| 47 | 10.6 | 4.452 | 3.498 | 8.692 | 9.116 | 890.03 |
| 48 | 23.8 | 8.092 | 6.664 | 23.086 | 20.706 | 992.61 |
| 49 | 13.8 | 4.968 | 4.554 | 5.382 | 11.592 | 670.31 |
| 50 | 17.4 | 7.308 | 5.568 | 14.094 | 15.660 | 791.14 |

| | ins_losses | abbrev |
|---|---|---|
| 0 | 145.08 | AL |
| 1 | 133.93 | AK |
| 2 | 110.35 | AZ |
| 3 | 142.39 | AR |
| 4 | 165.63 | CA |
| 5 | 139.91 | CO |
| 6 | 167.02 | CT |
| 7 | 151.48 | DE |
| 8 | 136.05 | DC |
| 9 | 144.18 | FL |
| 10 | 142.80 | GA |
| 11 | 120.92 | HI |
| 12 | 82.75 | ID |
| 13 | 139.15 | IL |
| 14 | 108.92 | IN |
| 15 | 114.47 | IA |
| 16 | 133.80 | KS |
| 17 | 137.13 | KY |
| 18 | 194.78 | LA |

```
19       96.57     ME
20      192.70     MD
21      135.63     MA
22      152.26     MI
23      133.35     MN
24      155.77     MS
25      144.45     MO
26       85.15     MT
27      114.82     NE
28      138.71     NV
29      120.21     NH
30      159.85     NJ
31      120.75     NM
32      150.01     NY
33      127.82     NC
34      109.72     ND
35      133.52     OH
36      178.86     OK
37      104.61     OR
38      153.86     PA
39      148.58     RI
40      116.29     SC
41       96.87     SD
42      155.57     TN
43      156.83     TX
44      109.48     UT
45      109.61     VT
46      153.72     VA
47      111.62     WA
48      152.56     WV
49      106.62     WI
50      122.04     WY
```

[ ]:
```
ak.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 51 entries, 0 to 50
Data columns (total 8 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   total           51 non-null     float64
 1   speeding        51 non-null     float64
 2   alcohol         51 non-null     float64
 3   not_distracted  51 non-null     float64
 4   no_previous     51 non-null     float64
 5   ins_premium     51 non-null     float64
 6   ins_losses      51 non-null     float64
```

```
 7   abbrev          51 non-null     object
dtypes: float64(7), object(1)
memory usage: 3.3+ KB
```

[ ]:
```
ak.head()
```

[ ]:
```
   total  speeding  alcohol  not_distracted  no_previous  ins_premium  \
0   18.8     7.332    5.640          18.048       15.040       784.55
1   18.1     7.421    4.525          16.290       17.014      1053.48
2   18.6     6.510    5.208          15.624       17.856       899.47
3   22.4     4.032    5.824          21.056       21.280       827.34
4   12.0     4.200    3.360          10.920       10.680       878.41

   ins_losses abbrev
0      145.08     AL
1      133.93     AK
2      110.35     AZ
3      142.39     AR
4      165.63     CA
```

[ ]:
```
ak.head(2)
```

[ ]:
```
   total  speeding  alcohol  not_distracted  no_previous  ins_premium  \
0   18.8     7.332    5.640          18.048       15.040       784.55
1   18.1     7.421    4.525          16.290       17.014      1053.48

   ins_losses abbrev
0      145.08     AL
1      133.93     AK
```

[ ]:
```
ak.tail(8)
```

[ ]:
```
    total  speeding  alcohol  not_distracted  no_previous  ins_premium  \
43   19.4     7.760    7.372          17.654       16.878      1004.75
44   11.3     4.859    1.808           9.944       10.848       809.38
45   13.6     4.080    4.080          13.056       12.920       716.20
46   12.7     2.413    3.429          11.049       11.176       768.95
47   10.6     4.452    3.498           8.692        9.116       890.03
48   23.8     8.092    6.664          23.086       20.706       992.61
49   13.8     4.968    4.554           5.382       11.592       670.31
50   17.4     7.308    5.568          14.094       15.660       791.14

    ins_losses abbrev
43      156.83     TX
44      109.48     UT
45      109.61     VT
46      153.72     VA
```

```
47      111.62     WA
48      152.56     WV
49      106.62     WI
50      122.04     WY
```

[ ]:
```
ak.tail()
```

[ ]:
```
    total  speeding  alcohol  not_distracted  no_previous  ins_premium  \
46   12.7     2.413    3.429          11.049       11.176       768.95
47   10.6     4.452    3.498           8.692        9.116       890.03
48   23.8     8.092    6.664          23.086       20.706       992.61
49   13.8     4.968    4.554           5.382       11.592       670.31
50   17.4     7.308    5.568          14.094       15.660       791.14

    ins_losses abbrev
46      153.72     VA
47      111.62     WA
48      152.56     WV
49      106.62     WI
50      122.04     WY
```

[ ]:
```
ak.shape
```

[ ]:
```
(51, 8)
```

[ ]:
```
ak.describe()
```

[ ]:
```
           total   speeding    alcohol  not_distracted  no_previous  \
count  51.000000  51.000000  51.000000       51.000000    51.000000
mean   15.790196   4.998196   4.886784       13.573176    14.004882
std     4.122002   2.017747   1.729133        4.508977     3.764672
min     5.900000   1.792000   1.593000        1.760000     5.900000
25%    12.750000   3.766500   3.894000       10.478000    11.348000
50%    15.600000   4.608000   4.554000       13.857000    13.775000
75%    18.500000   6.439000   5.604000       16.140000    16.755000
max    23.900000   9.450000  10.038000       23.661000    21.280000

       ins_premium  ins_losses
count    51.000000   51.000000
mean    886.957647  134.493137
std     178.296285   24.835922
min     641.960000   82.750000
25%     768.430000  114.645000
50%     858.970000  136.050000
75%    1007.945000  151.870000
max    1301.520000  194.780000
```

[ ]:
```
corr = ak.corr()
corr
```

```
<ipython-input-12-cd014e0cc39d>:1: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it will
default to False. Select only valid columns or specify the value of numeric_only
to silence this warning.
  corr = ak.corr()
```

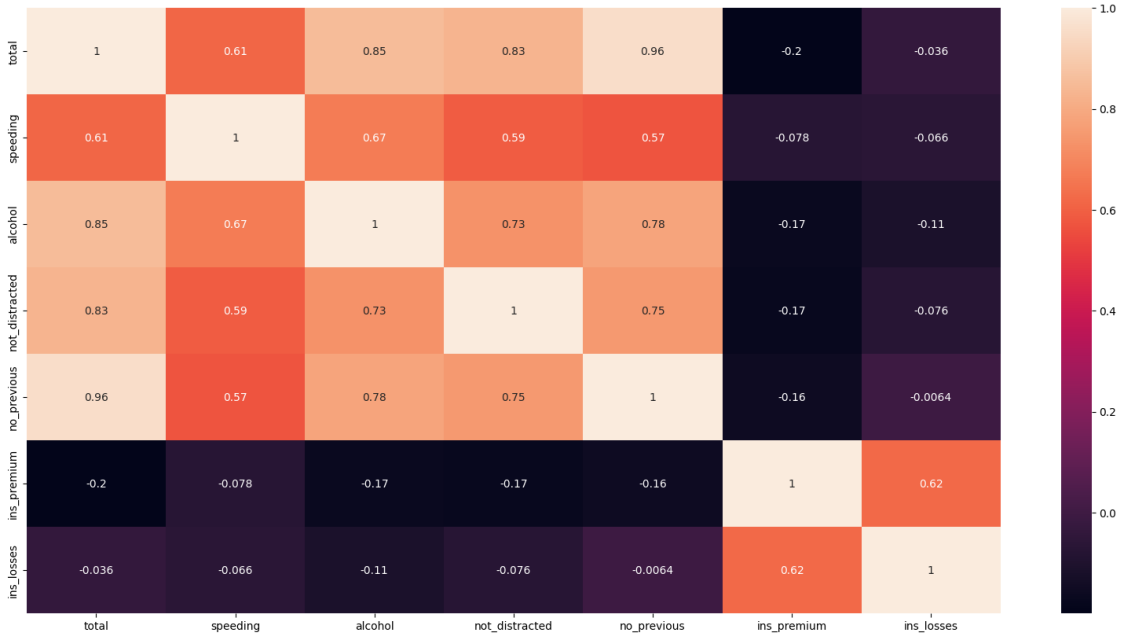
[ ]:

| | total | speeding | alcohol | not_distracted | no_previous | \ |
|---|---|---|---|---|---|---|
| total | 1.000000 | 0.611548 | 0.852613 | 0.827560 | 0.956179 | |
| speeding | 0.611548 | 1.000000 | 0.669719 | 0.588010 | 0.571976 | |
| alcohol | 0.852613 | 0.669719 | 1.000000 | 0.732816 | 0.783520 | |
| not_distracted | 0.827560 | 0.588010 | 0.732816 | 1.000000 | 0.747307 | |
| no_previous | 0.956179 | 0.571976 | 0.783520 | 0.747307 | 1.000000 | |
| ins_premium | -0.199702 | -0.077675 | -0.170612 | -0.174856 | -0.156895 | |
| ins_losses | -0.036011 | -0.065928 | -0.112547 | -0.075970 | -0.006359 | |

| | ins_premium | ins_losses |
|---|---|---|
| total | -0.199702 | -0.036011 |
| speeding | -0.077675 | -0.065928 |
| alcohol | -0.170612 | -0.112547 |
| not_distracted | -0.174856 | -0.075970 |
| no_previous | -0.156895 | -0.006359 |
| ins_premium | 1.000000 | 0.623116 |
| ins_losses | 0.623116 | 1.000000 |

[ ]:
```
plt.subplots(figsize = (20,10))
sns.heatmap(corr,annot=True)
```

[ ]:
```
<Axes: >
```




[ ]:
```
ak["total"].value_counts()
```

[ ]:
```
14.1    2
12.8    2
13.6    2
21.4    2
19.4    2
23.9    2
14.9    1
14.7    1
11.6    1
11.2    1
18.4    1
12.3    1
16.8    1
19.9    1
17.6    1
18.2    1
11.1    1
19.5    1
11.3    1
12.7    1
10.6    1
23.8    1
13.8    1
16.1    1
```

```
18.8    1
9.6     1
18.1    1
18.6    1
22.4    1
12.0    1
10.8    1
16.2    1
5.9     1
17.9    1
15.6    1
17.5    1
15.3    1
14.5    1
15.7    1
17.8    1
20.5    1
15.1    1
12.5    1
8.2     1
17.4    1
Name: total, dtype: int64
```

[ ]:
```
ak.alcohol.value_counts()
```

[ ]:
```
5.208     2
5.640     1
4.218     1
4.704     1
3.480     1
3.136     1
4.968     1
3.567     1
10.038    1
4.794     1
5.771     1
3.328     1
5.642     1
9.799     1
9.416     1
6.402     1
5.655     1
7.372     1
1.808     1
4.080     1
3.429     1
3.498     1
```

```
6.664     1
4.554     1
5.215     1
5.474     1
4.525     1
5.456     1
5.824     1
3.360     1
3.808     1
3.888     1
4.860     1
1.593     1
5.191     1
3.900     1
7.175     1
4.437     1
4.352     1
4.205     1
3.925     1
4.272     1
4.922     1
6.765     1
4.530     1
4.000     1
2.870     1
3.948     1
2.784     1
5.568     1
Name: alcohol, dtype: int64
```

[ ]:
```
ak.isnull().any()
```

[ ]:
```
total             False
speeding          False
alcohol           False
not_distracted    False
no_previous       False
ins_premium       False
ins_losses        False
abbrev            False
dtype: bool
```

[ ]:
```
ak.isnull().sum()
```

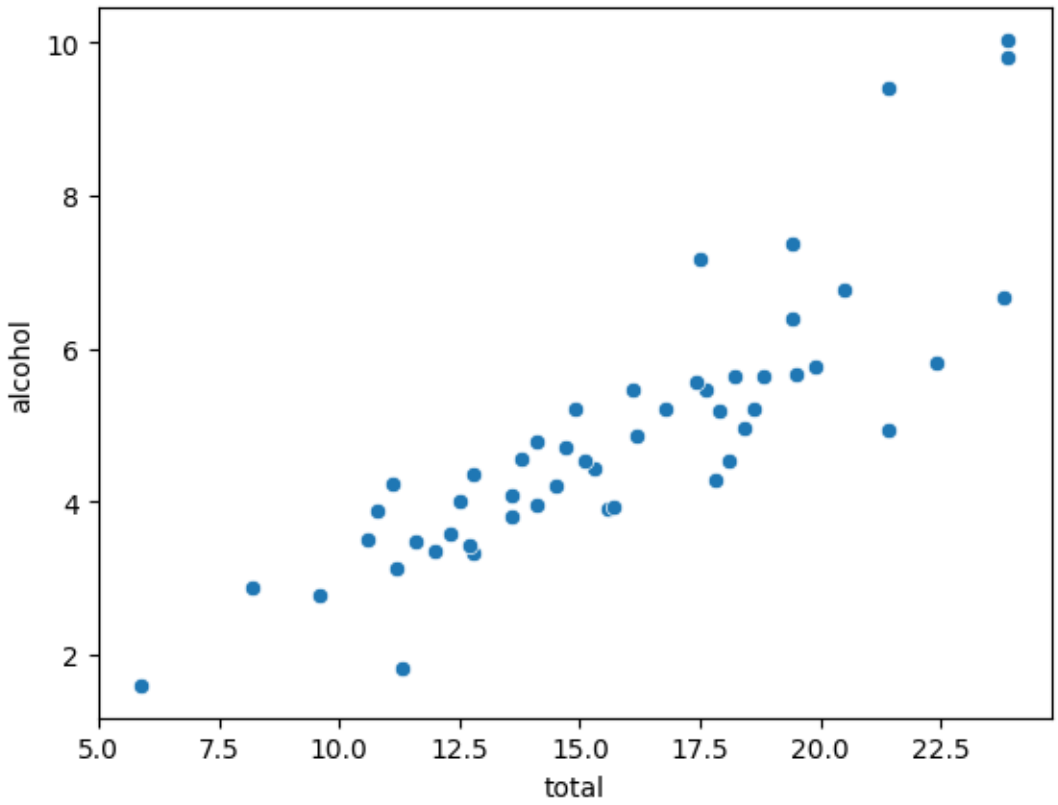
[ ]:
```
total             0
speeding          0
alcohol           0
```

```
not_distracted    0
no_previous       0
ins_premium       0
ins_losses        0
abbrev            0
dtype: int64
```

DATA VISUALIZAION

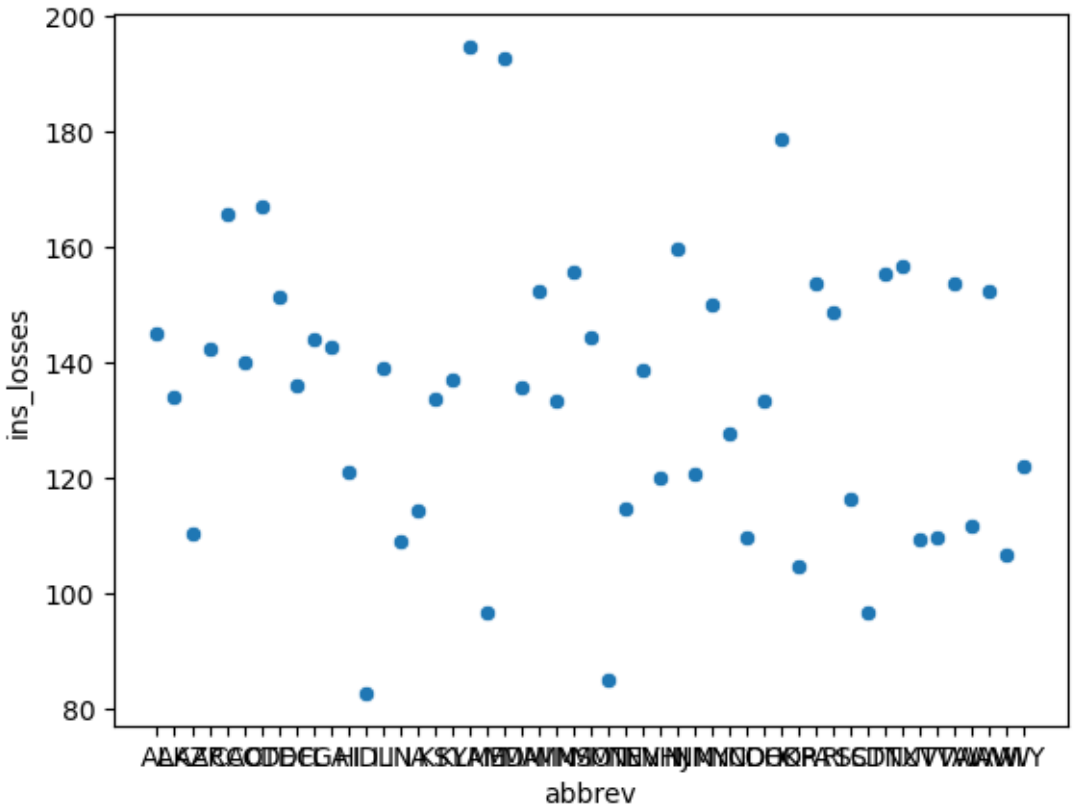
[ ]:
```
sns.scatterplot(x="total",y="alcohol", data=ak)
```

[ ]:
```
<Axes: xlabel='total', ylabel='alcohol'>
```



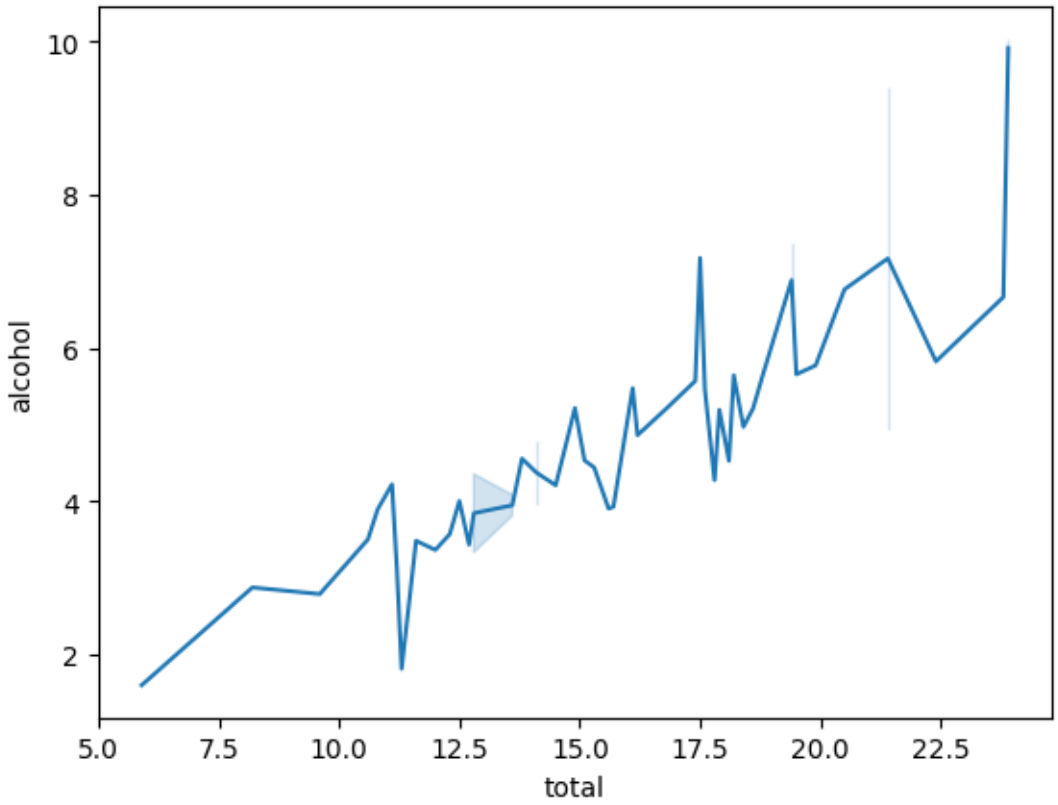

[ ]:
```
sns.scatterplot(x="abbrev",y="ins_losses",data=ak)
```

[ ]:
```
<Axes: xlabel='abbrev', ylabel='ins_losses'>
```




[ ]:
```
#Lineplot
sns.lineplot(y="alcohol",x="total",data=ak)
```

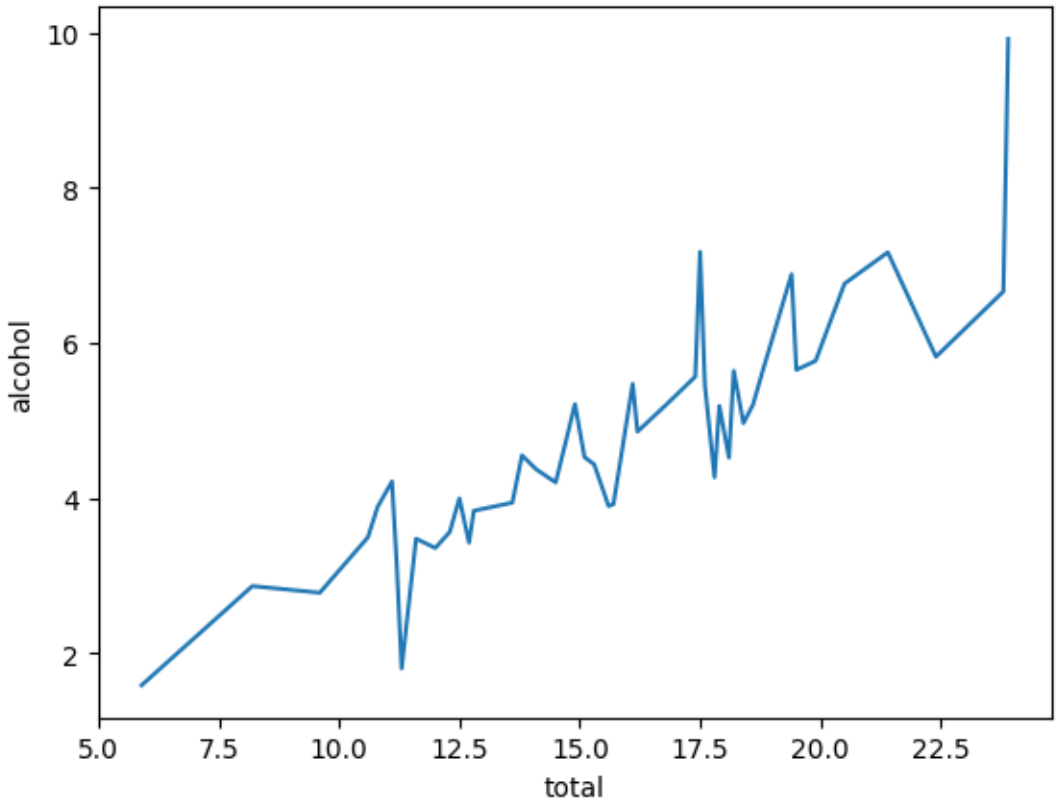
[ ]:
```
<Axes: xlabel='total', ylabel='alcohol'>
```




[ ]:
```
#Lineplot
sns.lineplot(y="alcohol",x="total",data=ak,ci=None)
```

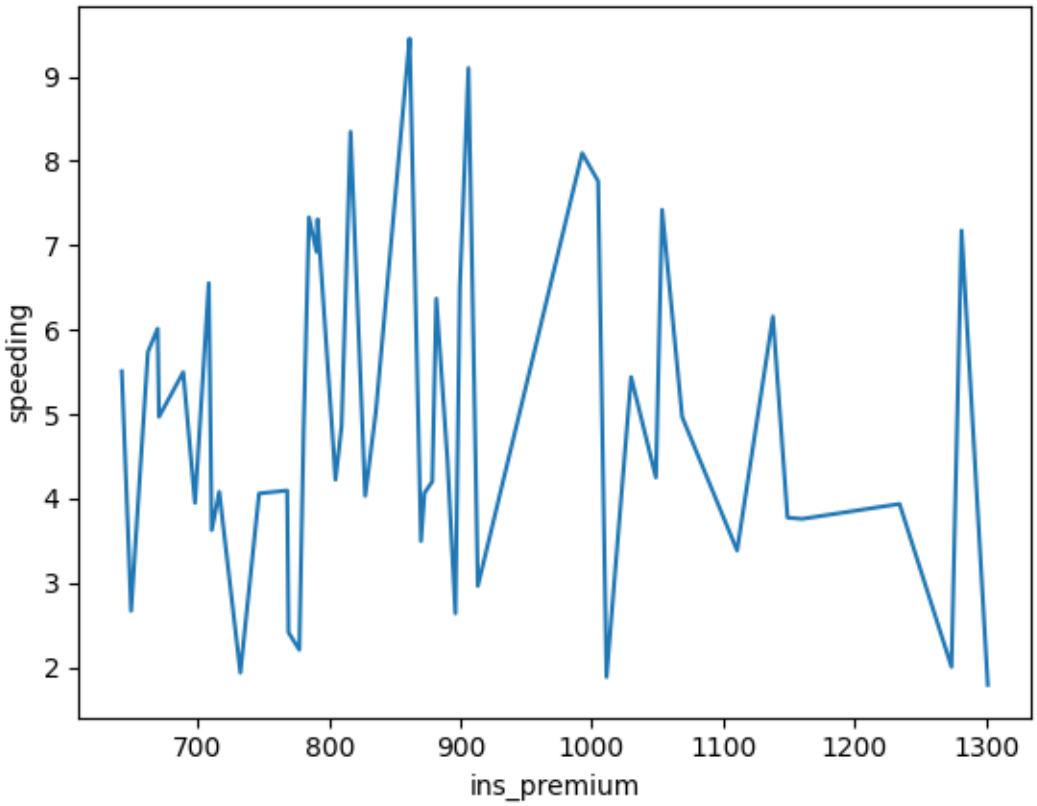
```
<ipython-input-21-d491e3384d9c>:2: FutureWarning:

The `ci` parameter is deprecated. Use `errorbar=None` for the same effect.

  sns.lineplot(y="alcohol",x="total",data=ak,ci=None)
```

[ ]: <Axes: xlabel='total', ylabel='alcohol'>




[ ]:
```
sns.lineplot(x="ins_premium",y="speeding",data=ak)
```

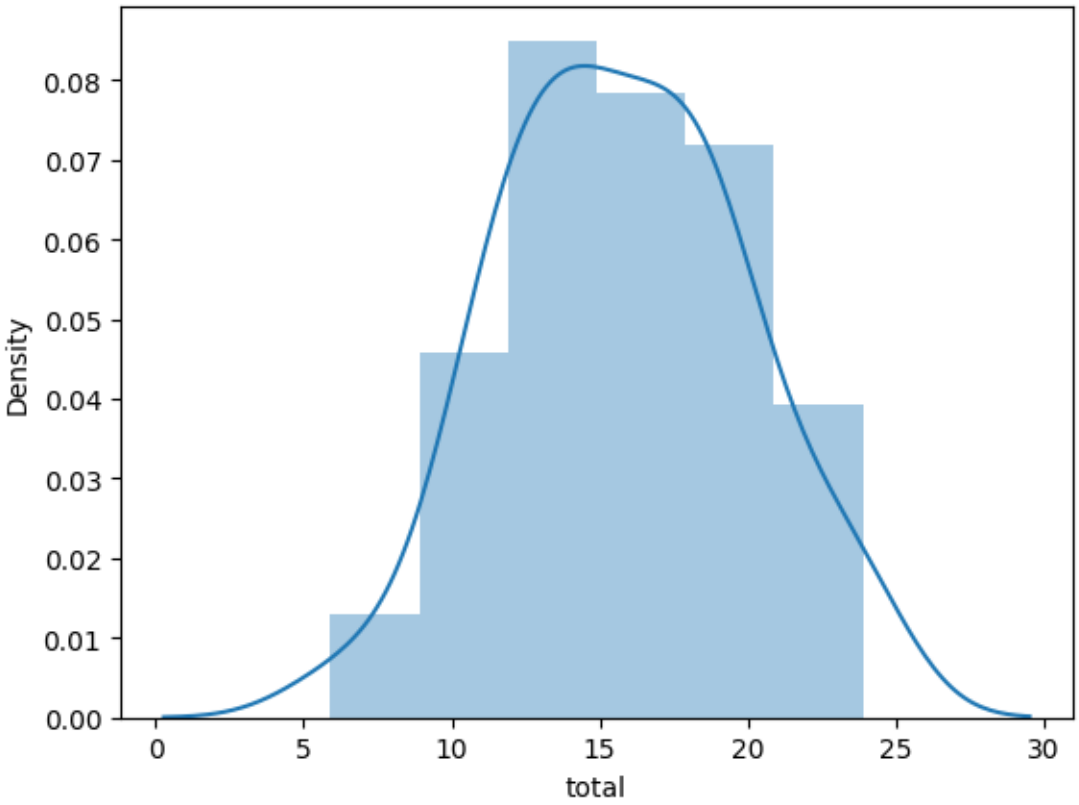
[ ]:
```
<Axes: xlabel='ins_premium', ylabel='speeding'>
```




[ ]:
```
#Displot
sns.distplot(ak["total"])
```

```
<ipython-input-23-18a78abad740>:2: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(ak["total"])
```

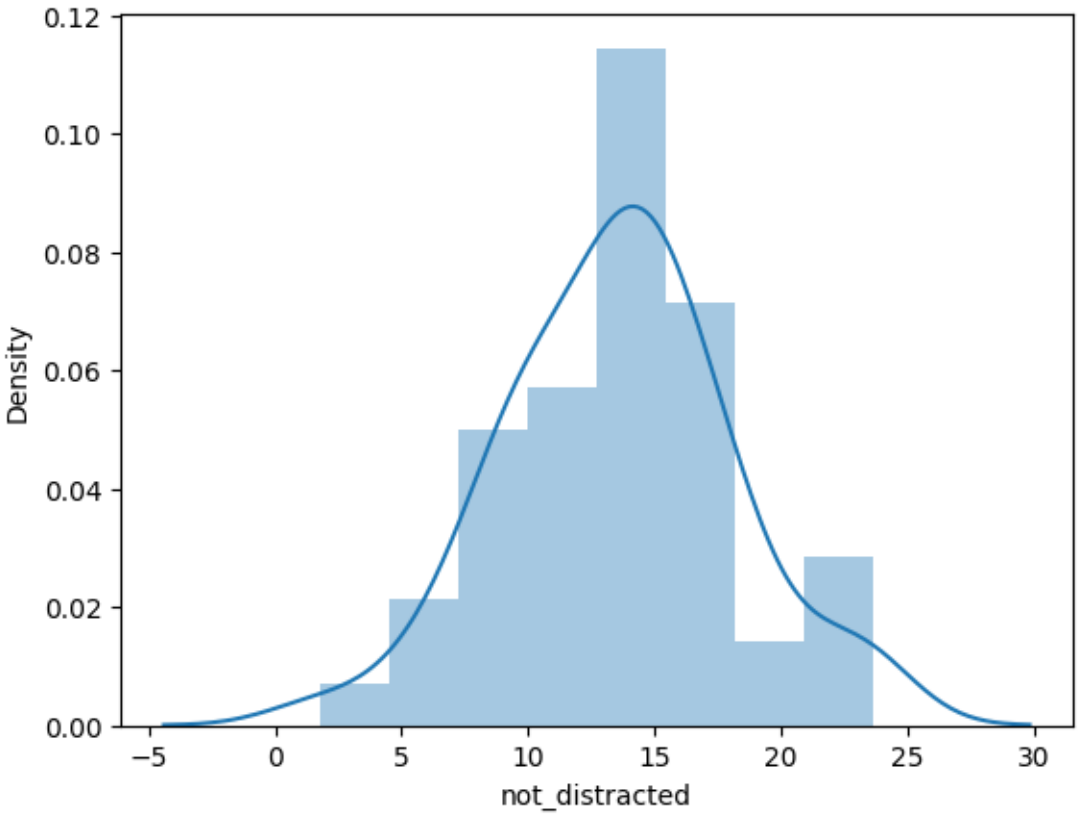
[ ]: <Axes: xlabel='total', ylabel='Density'>




[ ]:
```
sns.distplot(ak["not_distracted"])
```

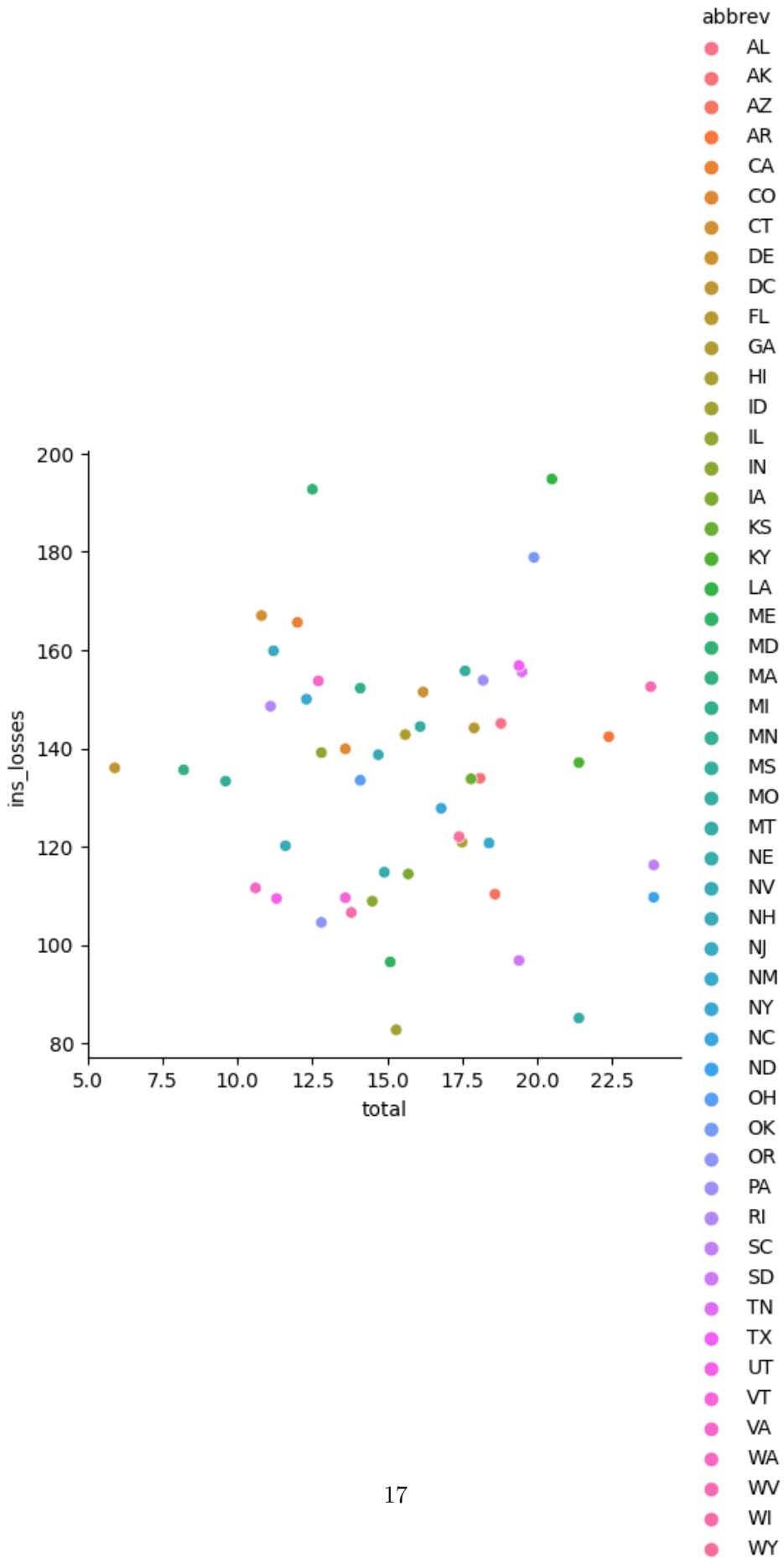
```
<ipython-input-24-bb0c8d7ed882>:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(ak["not_distracted"])
```

[ ]:
```
<Axes: xlabel='not_distracted', ylabel='Density'>
```



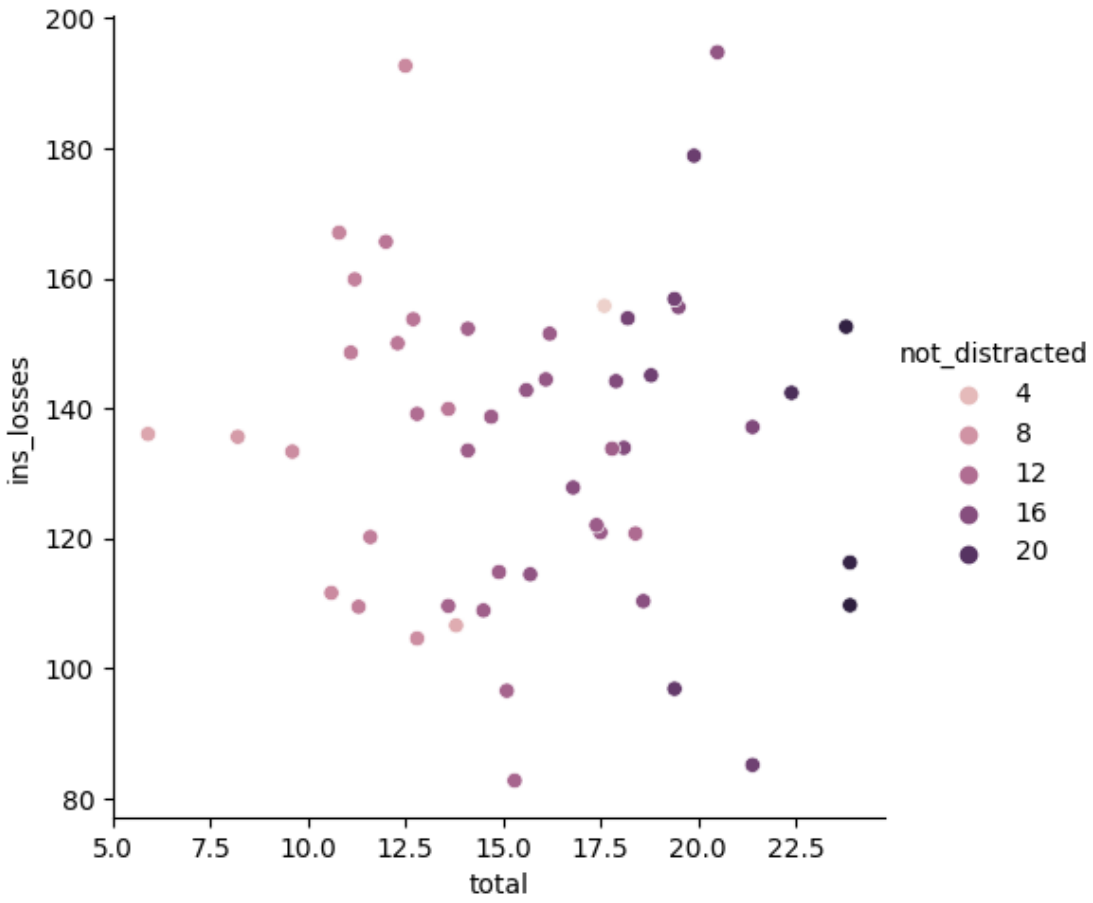

[ ]:
```
#Relationplot
sns.relplot(x="total",y="ins_losses",data=ak,hue="abbrev")
```

[ ]:
```
<seaborn.axisgrid.FacetGrid at 0x7e3d2e3066b0>
```


ins_losses
total
200
180
160
140
120
100
80
5.0
7.5
10.0
12.5
15.0
17.5
20.0
22.5
abbrev
AL
AK
AZ
AR
CA
CO
CT
DE
DC
FL
GA
HI
ID
IL
IN
IA
KS
KY
LA
ME
MD
MA
MI
MN
MS
MO
MT
NE
NV
NH
NJ
NM
NY
NC
ND
OH
OK
OR
PA
RI
SC
SD
TN
TX
UT
VT
VA
WA
WV
WI
WY

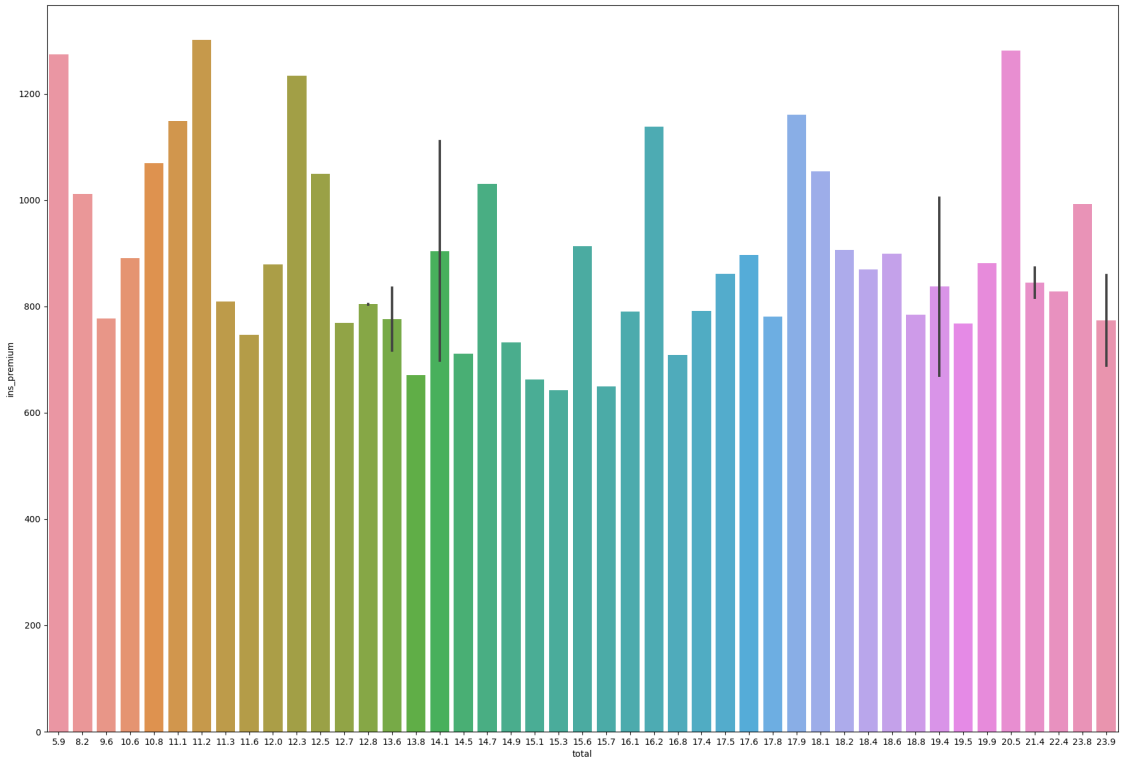
[ ]:
```
#Relationplot
sns.relplot(x="total",y="ins_losses",data=ak,hue="not_distracted")
```

[ ]:
```
<seaborn.axisgrid.FacetGrid at 0x7e3d2e496fe0>
```



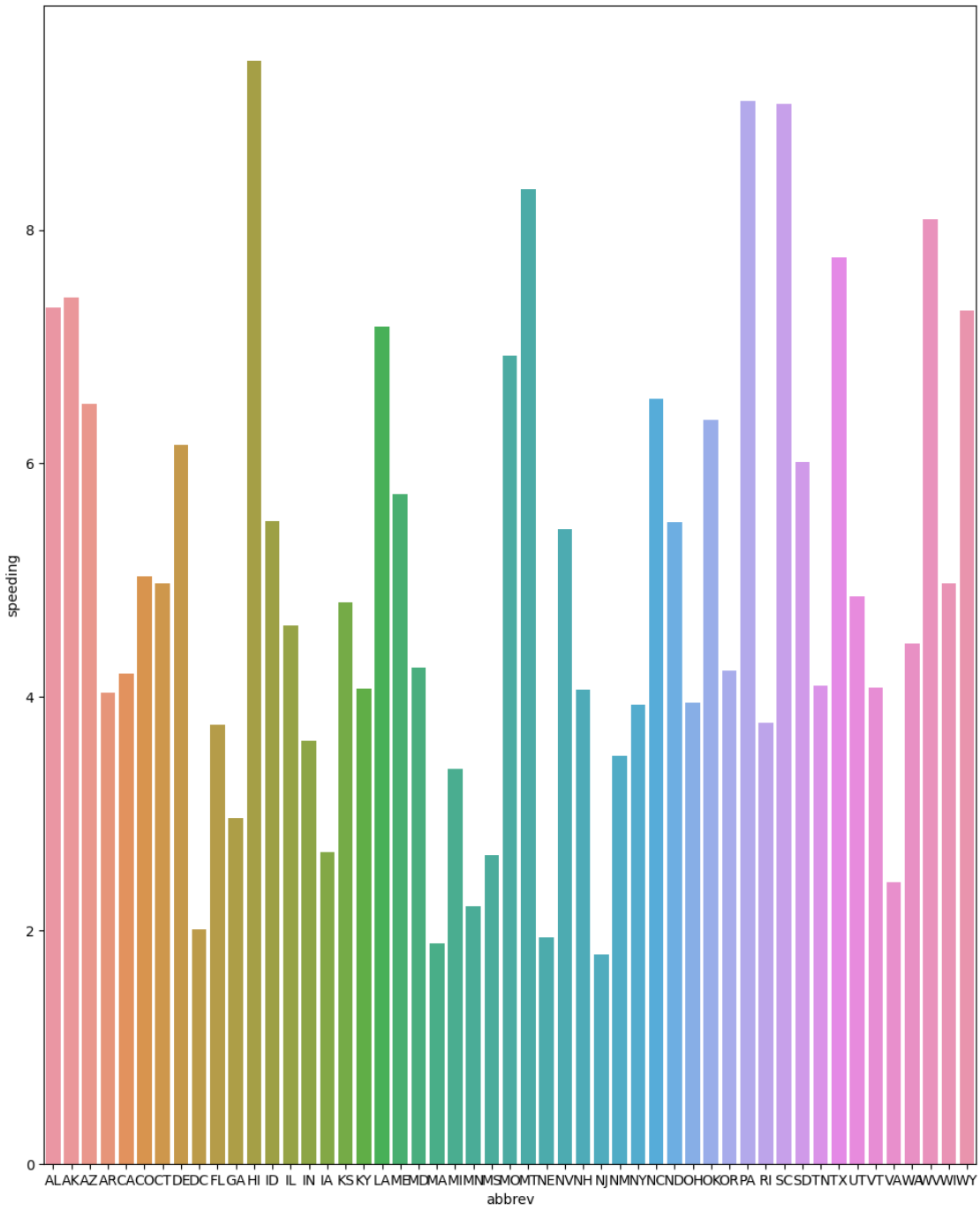

[ ]:
```
#barplot
plt.subplots(figsize=(22,15))
sns.barplot(x="total",y="ins_premium",data=ak)
```

[ ]:
```
<Axes: xlabel='total', ylabel='ins_premium'>
```



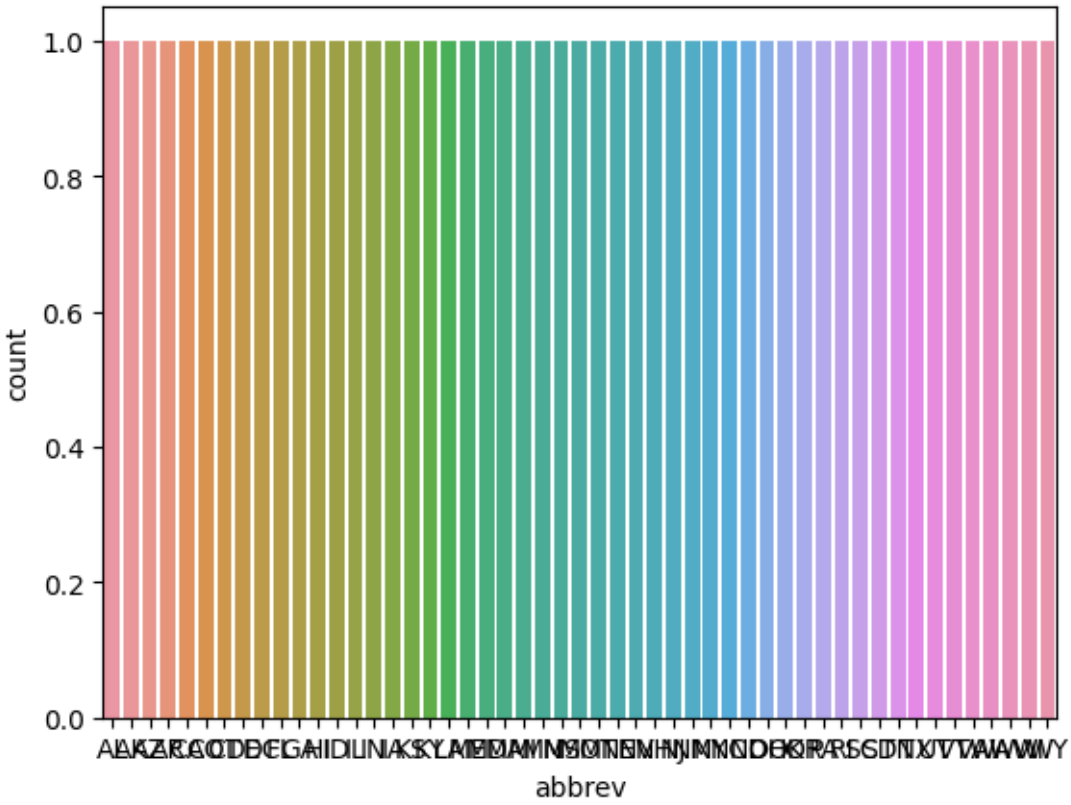

[ ]:
```
#barplot
plt.subplots(figsize=(12,15))
sns.barplot(y="speeding",x="abbrev",data=ak)
```

[ ]: <Axes: xlabel='abbrev', ylabel='speeding'>



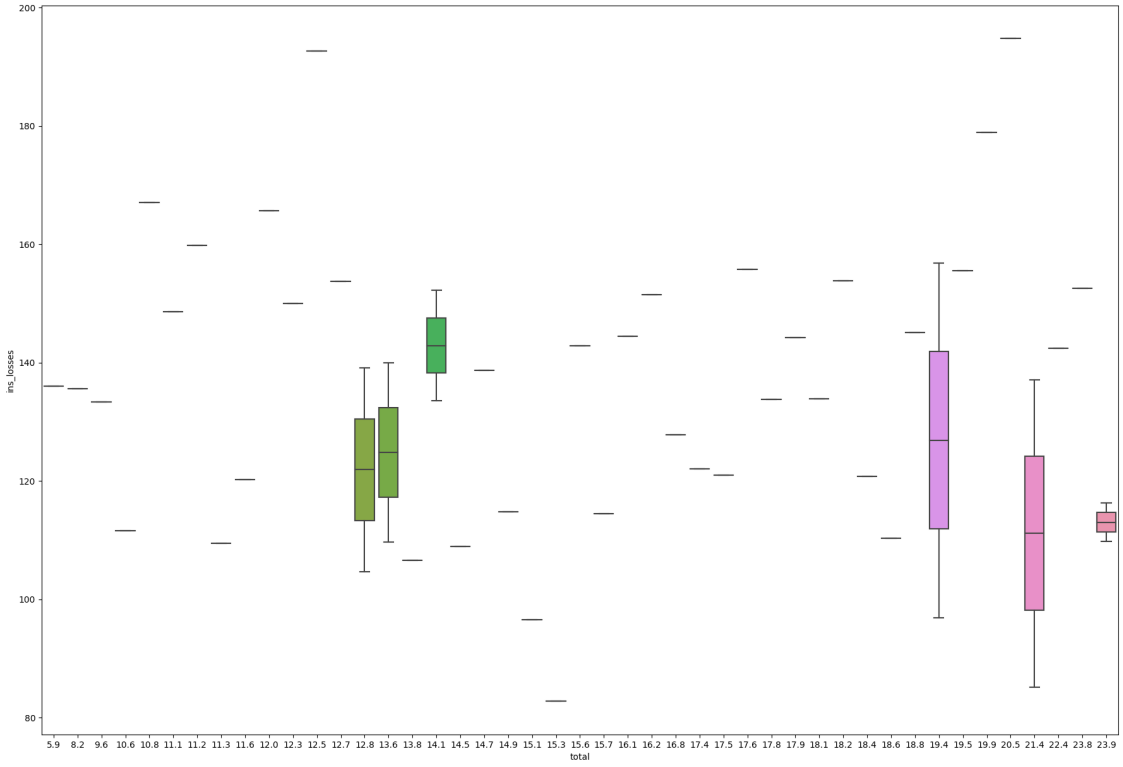

[ ]:
```
#Count Plot
sns.countplot(x="abbrev",data=ak)
```

[ ]:
```
<Axes: xlabel='abbrev', ylabel='count'>
```




[ ]:
```
#boxplot
plt.subplots(figsize=(22,15))
sns.boxplot(x="total",y="ins_losses",data=ak)
```

[ ]:
```
<Axes: xlabel='total', ylabel='ins_losses'>
```


ins_losses
total
200
180
160
140
120
100
80
5.9 8.2 9.6 10.6 10.8 11.1 11.2 11.3 11.6 12.0 12.3 12.5 12.7 12.8 13.6 13.8 14.1 14.5 14.7 14.9 15.1 15.3 15.6 15.7 16.1 16.2 16.8 17.4 17.5 17.6 17.8 17.9 18.1 18.2 18.4 18.6 18.8 19.4 19.5 19.9 20.5 21.4 22.4 23.8 23.9